

# NASA TECH BRIEF

## Langley Research Center

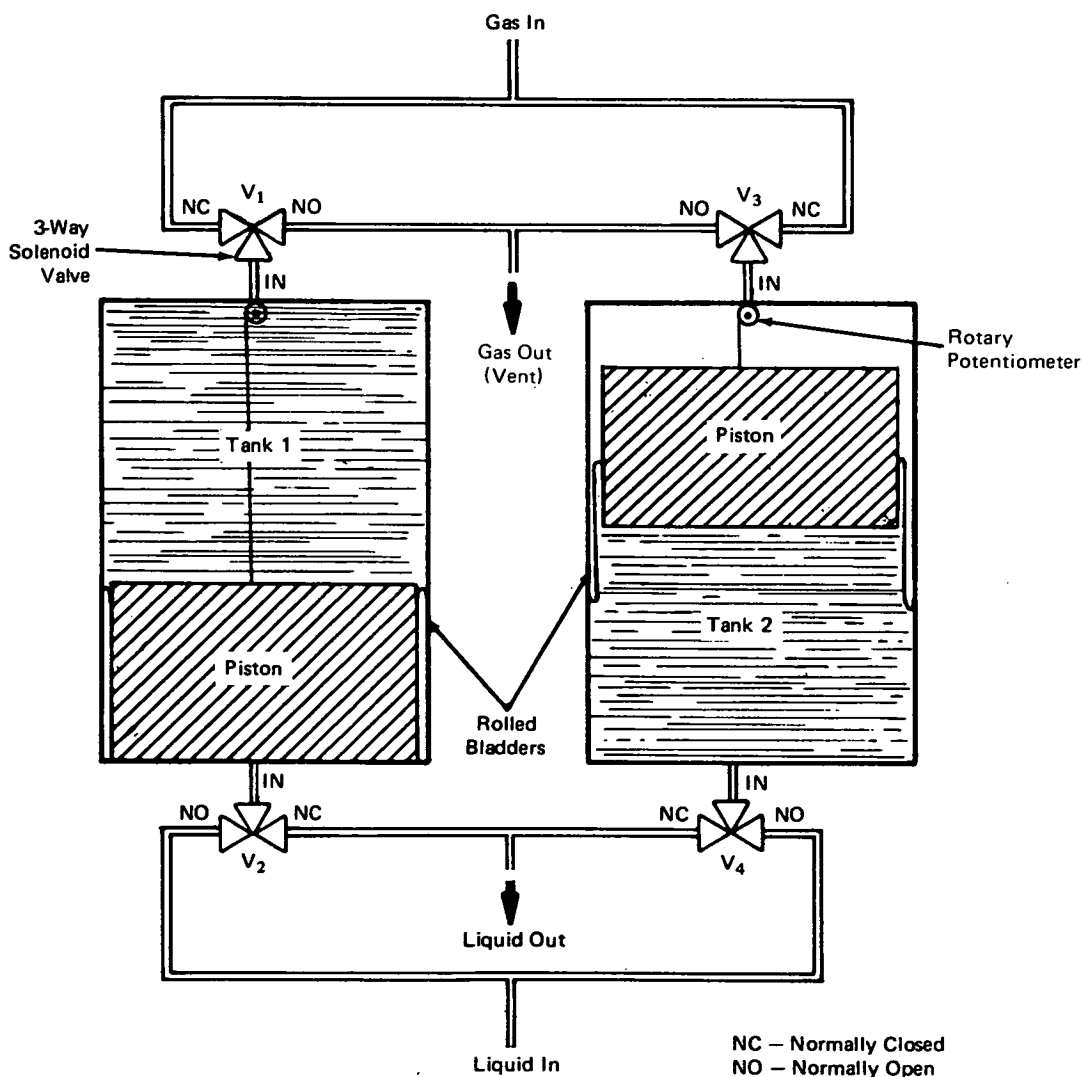


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### Automatic Water Inventory, Collecting, and Dispensing Unit

An automatic water inventory, collecting, and dispensing unit has been devised for operation in zero gravity. It is possible for this unit to be used in

operations that require automatic collection and dispensing of liquids, while simultaneously maintaining a liquid inventory.



(continued overleaf)

The unit consists of two cylindrical tanks with piston-bladders and associated components which automatically control the filling and emptying of the tanks.

Liquid inventory readout devices are also provided which indicate the quantity of liquid in each tank as well as the number of times each tank has emptied. The tanks are equipped with three-way solenoid valves and spring loaded rotary potentiometers that track the movement of the piston-bladders to perform these functions. (See Figure).

### Operation:

In a situation where tank 1 is empty and tank 2 is full, the operation proceeds as follows:

1. Tank 1 can be filled through the NO (normally open) port of  $V_2$  (valve 2) while the gas side of the bladder is vented through the NO port of  $V_1$ . Simultaneously, tank 2 can be emptied through the normally closed (NC) port of  $V_4$ . Gas entering tank 2 through the NC port of  $V_3$  forces the piston down, which purges the water from the tank. When tank 2 is empty and tank 1 is full, the solenoid valve ports are switched through control circuits connected to the potentiometers which track the positions of the piston bladders in the tanks.
2. In tank 1, which had been filling, the NO ports are closed and the NC ports are opened. Gas enters the back side of the bladder which forces the water out of the tank through the NC port of  $V_2$ , simultaneously, tank 2 can be filled through the NO port of  $V_4$ , while the gas side of the bladder is vented through the NO port of  $V_3$ .
3. The above events occur simultaneously, when tank 1 is full and tank 2 is empty, the unit reverses, and tank 1 will empty while tank 2 is filling.

The movement of the bladders and pistons in the tanks is continuously monitored, and readout is provided during all stages of operation.

### Possible Use:

This equipment could be used to collect, store, and dispense liquids as well as maintain a liquid inventory during testing of water reclamation or other liquid systems. Spherical tanks containing form-fitting diaphragms could be used as well as the piston cylinder tanks with rolled diaphragms.

### Note:

No additional documentation is available. Specific inquiries, however, may be directed to:

Technology Utilization Officer  
Langley Research Center  
Mail Stop 139-A  
Hampton, Virginia 23365  
Reference: B72-10663

### Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to:

Patent Counsel  
Langley Research Center  
Mail Stop 173  
Hampton, Virginia 23365

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